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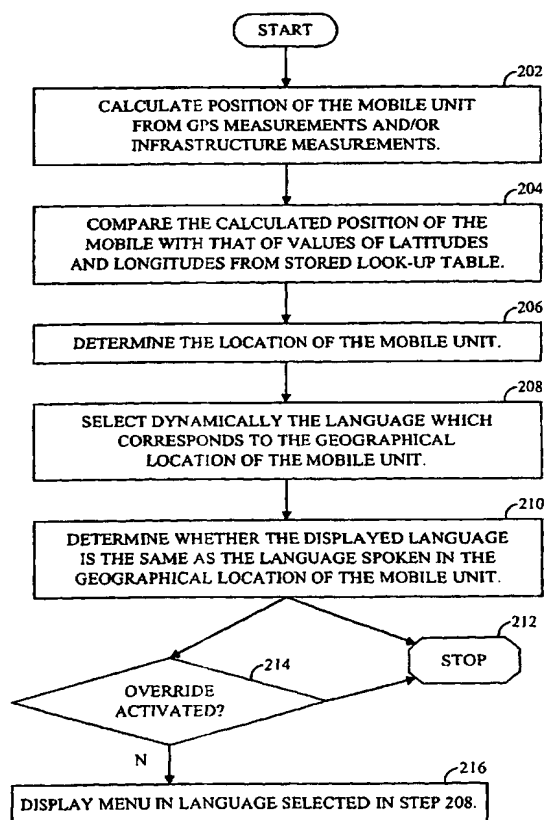
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[Continued on next page]

(54) Title: AUTOMATED LOCATION BASED CONFIGURATION OF PORTABLE PHONE



(57) Abstract: A method and apparatus for tracking a position of a mobile radio unit within a communication system. The mobile unit uses information from earth orbiting satellites and/or information received from infrastructure of the system to dynamically select alternative operating parameters. The method includes providing a controller and storing a look-up table in memory coupled to the controller. The method further includes a calculating a position of the mobile unit using measurements from the earth orbiting satellite system and/or the system infrastructure. Position values from the look-up table are compared with that of the position of the mobile radio unit in order to determine the geographical location of the mobile unit from the look-up table. At least one operating parameter is then dynamically selected based upon the determined geographical location. In preferred embodiments, the mobile radio unit dynamically selects either a specific language in which to display menu options or an encryption scheme based on the determined geographical location.

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# AUTOMATED LOCATION BASED CONFIGURATION OF PORTABLE PHONE

**BACKGROUND OF THE INVENTION**

**I. Field of the Invention**

The present invention relates generally to mobile radio communication systems. More particularly the present invention relates to mobile radio communication systems where the position of a mobile radio unit is tracked as the unit moves about the system. Even more particularly, the present invention relates to a method which uses positioning information from a global position satellite (GPS) system or system infrastructure equipment. Specifically, the present invention relates to a method for determining the position of the mobile unit and dynamically selecting at least one telephone parameter in accordance with the determined position.

20 **II. Description of the Related Art**

Current mobile telephones typically display menu options to a user in a single language. To the extent that a particular mobile telephone is manufactured for markets where different languages are spoken, different software that reflects the language of each market must typically be installed in each phone. For example, software that displays menu options in French must be installed in those units to be sold in France, software that displays menu options in Spanish must be installed in those units to be sold in Spain, and so on. The installation of such language-specific software in each telephone increases manufacturing costs and geographically limits the marketability of each phone. More particularly, once software reflecting a particular language is installed in a given phone, it is difficult to market the phone in other geographic regions where the installed language may not be spoken.

Though mobile service providers have developed many schemes to determine the position of a mobile communication unit, none, until now, have recognized the

importance of the mobile unit having the ability, not only to determine the position, but also to dynamically adjust a menu of options and instructions to the language spoken in the geographical location of the mobile unit and displaying such to the user.

The encryption schemes in current Internet browsers and wireless telephones  
5 must pass NSA certification before being approved for export from the United States. In the Internet browser area, browser authors have handled this problem by developing multiple versions of a given browser, each containing a different encryption scheme. For example, one version of a given browser will contain an encryption scheme that is approved for domestic use and a second version of the browser will contain a different  
10 encryption scheme that is approved for use abroad. Again, the creation of multiple versions of the same browser in this way increases manufacturing costs and geographically limits the marketability of each unit.

In view of these deficiencies, it would be desirable for a mobile unit to dynamically select an encryption scheme that is approved for use in the geographical  
15 location of the mobile unit. In other words, it would be desirable for the mobile unit to have the ability to dynamically select an encryption level approved by the NSA for the geographical location in which the mobile unit is positioned.

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### **SUMMARY OF THE INVENTION**

The present invention is directed to a method for tracking a position of a mobile radio unit within a communication system. The mobile unit uses information from earth orbiting satellites and/or information received from infrastructure of the system to  
25 dynamically select alternative operating parameters. The method includes providing a controller and storing a look-up table in a memory coupled to the controller. The method further includes calculating a position of the mobile unit using measurements from the earth orbiting satellite system and/or the system infrastructure. Position values from the look-up table are compared with that of the position of the mobile radio unit in  
30 order to determine the geographical location of the mobile unit from the look-up table.

At least one operating parameter is then dynamically selected based upon the determined geographical location. In the preferred embodiments, the mobile radio unit dynamically selects either a specific language in which to display menu options or an encryption scheme based on the determined geographical location.

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### **BRIEF DESCRIPTION OF THE DRAWINGS**

The features, objects and advantages of the present invention will become more apparent from the detailed description set forth below when taken in conjunction with the drawings in which like reference characters identify corresponding throughout and wherein:

Fig. 1 illustrates how a language used for displaying menu options to a mobile phone user is dynamically selected in accordance with the present invention.

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Fig. 2 illustrates how an encryption scheme used in a mobile phone is dynamically selected in accordance with the present invention.

Fig. 3 is a block diagram showing the components of an exemplary mobile radio unit used for implementing the menu language and encryption scheme selection systems of the present invention.

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Fig. 4 is an illustration of a mobile unit in accordance with the present invention.

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### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring to Fig. 1, there is shown a method for dynamically altering the language in which menu options are displayed on a mobile phone, in accordance with the present invention. In step 202, the position of the mobile unit is determined using GPS measurements and/or infrastructure measurements. Methods for calculating the position of a mobile unit from GPS measurements are well known in the art. U.S.

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Patent Appl. No. 08/659,409 entitled "Method for Using Only Two Base Stations for Determining the Position of a Mobile Subscriber in a CDMA Cellular Telephone System", filed June 6, 1996, owned by the assignee of the present invention and incorporated herein by reference, discloses alternative systems for determining the position of a mobile unit from infrastructure measurements. U.S. Patent Application  
5 No. 09/040,501, entitled "System and Method for Determining the Position of a Wireless CDMA Transceiver", filed March 17, 1998 and U.S. Patent Application entitled "Wireless User Position Update Using Infrastructure Measurements", filed November 19, 1998, both of which are owned by the assignee of the present invention  
10 and incorporated herein by reference, disclose further methods for determining the position of a mobile unit using GPS and/or infrastructure measurements.

In Step 204, the position of the mobile radio unit (as determined in step 202) is compared with that of values of latitude and longitudes from a stored look-up table. In  
15 Step 206, the geographic location of the mobile unit (e.g., the country or area in which the mobile unit is located) is determined from the look-up table.

In Step 208, the language which corresponds to the geographical location of the mobile radio unit is dynamically selected for use on the mobile unit display.

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In Step 210, it is determined whether the dynamically selected language is the same as that which is currently displayed in the menu window or user interface (U/I) 25 of the mobile unit 30, as shown in Figure 4. If the language displayed in the menu window is the same as that of the dynamically selected language, then the method stops  
25 as shown in Step 212.

If the language displayed in the menu window of the mobile unit is different than the dynamically selected language (and no override has been activated by the user), then in step 216, the menu is displayed to the user in the language selected in step 208.

5       The look-up table used in step 204 can be configured as a relational database. In addition, a message table can also be implemented using offsets output from the look-up table. Each of the offsets points to a block in the message table that contains all the possible words to be displayed on the system U/I for a given language selection. In the preferred embodiment, there is one look-up table containing, among other things, ranges  
10 of latitudes and longitudes corresponding to each country in the world, the language corresponding to each of those countries, an offset value (associated with the message table described above) corresponding to each country, and approved encryption levels corresponding to each country or geographical area. The details of setting up and implementing both message tables and relational databases are well known in the art.

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Also in the preferred embodiment of the present application, it is desirable to incorporate an override (step 214) to allow a user to manually set the language displayed in the menu to a desired language irrespective of the location of the mobile unit.

20       Using the invention shown in Figure 1, a vendor can manufacture a phone with one software package containing multiple languages. As the phones are shipped to other countries, the language contained in the menu window or user interface dynamically displays that country's language, thus reducing production costs and eliminating the need for separate the mobile units according to language or country.

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Referring now to Figure 2, there is shown a method for dynamically altering the encryption scheme used in a mobile phone, in accordance with the present invention.

Steps 402, 404 and 406, are performed in the same manner as discussed above with respect to Steps 202, 204 and 206 respectively.

In Step 408, an encryption level is dynamically selected which corresponds to  
5 the location of the mobile radio unit from the look-up table, and in Step 410, the appropriate encryption level is invoked with respect to the mobile unit's geographical location. In a preferred embodiment, the encryption method is selected such that while the mobile is in U.S. territory, the mobile unit uses a full 128-bit encryption capability. Alternatively, when the mobile unit is outside U.S. territory, the mobile unit uses a  
10 different encryption level, for example 48 bits, that is authorized for the mobile unit's geographical location, as determined by NSA. Here too, a vendor can realize savings in production as the vendor can build one mobile unit, gain NSA approval one time and then ship the mobile unit worldwide

15 Referring now to Fig. 3, there is a block diagram showing the components of an exemplary code division multiple access (CDMA) mobile station 300 used for implementing the methods shown in figures 1 and 2. The mobile station includes an antenna system 330, which is coupled through diplexer 332 to analog receiver 334 and transmit power amplifier 336. Antenna system 330 and diplexer 332 are of standard  
20 design and permit simultaneous reception and transmission through one or more antennae. Antenna system 330 optionally includes one antenna for voice traffic, and a separate antenna for receiving GPS signals. Antenna system 330 collects signals transmitted to the mobile station from one or more base stations and/or the GPS system, and provides the signals through diplexer 332 to analog receiver 334. Receiver 334 is  
25 also provided with an analog to digital converter (not shown). Receiver 334 receives RF signals from diplexer 332, amplifies and frequency downconverts the signals, and provides a digitized output signal to digital data receivers 340, 342 and to search receiver 344. It will be understood that, although in the embodiment in Figure 3 only



two digital data receivers are shown, a low performance mobile station might have only a single digital data receiver while higher performance units will have two or more digital data receivers to permit diversity reception. The outputs of receivers 340 and 342 are provided to diversity and combiner circuitry 348 which time adjusts the two  
5 streams of data received from the receivers 340 and 342, adds the streams together and decodes the result. Details concerning the operation of the digital data receivers 340, 342, the search receiver 344, and the diversity combiner and decoder circuitry 348 are described in U.S. Patent No. 5,101,501 entitled "Method and Apparatus for Providing A Soft Handoff In Communications In A CDMA Cellular Telephone System", which is  
10 assigned to the assignee of the present invention and incorporated herein by reference.

An output signal is provided from the decoder 348 to control processor 346. The output signal from the decoder will include, for example, any pilot signals from the base stations that will be used for making positional measurements, and/or timing signals  
15 received from the GPS system. In response to this information, the control processor 346 determines the display language and encryption level parameters in accordance with the methods shown in Figures 1 and 2. All the steps shown in Figures 1 and 2 are preferably implemented in software on control processor 346; however, it will be understood by those skilled in the art that many of these steps could alternatively be  
20 implemented in the system infrastructure.

#### **I CLAIM:**

**CLAIMS**

1. A method for dynamically selecting alternate operating parameters of a mobile  
2 radio unit based on a position of the mobile radio unit, comprising the steps of:  
    providing a controller;  
4 storing a look-up table with position values in a memory coupled to the  
    controller;  
6 calculating a position of the mobile radio unit;  
    comparing the position values of the look-up table with the position of the  
8 mobile radio unit;  
    determining the geographical location of the mobile radio unit from the look up  
10 table;  
    selecting, dynamically, at least one parameter based upon the determined  
12 location; and  
    displaying information to a user in accordance with the at least one parameter.
2. The method of claim 1, wherein the at least one dynamically selected parameter  
2 is a language.
3. The method of claim 2, further comprising providing the look-up table with  
2 languages which correspond to geographical locations.

4. The method of claim 3, further comprising dynamically selecting from the look-up table the language which corresponds to the geographical location of the mobile radio unit.

5. The method of claim 4, further comprising determining whether the language currently spoken in a menu window of the mobile radio unit is the same as the language corresponding to the geographical location of the mobile radio unit.

6. An apparatus for dynamically selecting alternative operating parameters of a mobile unit based on a position of the mobile communication comprising:

- a controller;
- a look-up table with position values stored in a memory of the controller;
- a means for calculating a position of the mobile radio unit;
- a means for comparing the position values of the look-up table with the position of the mobile radio unit;
- a means for determining a geographical location of the mobile radio unit from the look-up table;
- a means for selecting, dynamically, at least one parameter based upon the determined location; and
- a means for displaying information to a user in accordance with the at least one parameter.

7. The apparatus of claim 6, wherein the at least one dynamically selected parameter is a language.

8. The apparatus of claim 7, wherein, the look-up table is provided with languages  
2 that correspond to geographical locations.

9. The apparatus of claim 8, further comprising a means for dynamically selecting  
2 from the look-up table the language which corresponds to the geographical location of  
the mobile radio unit.

10. The apparatus of claim 9, further comprising a means for determining whether  
2 the language currently displayed in a menu window of the mobile radio unit is the same  
as the language corresponding to the geographical location of the mobile radio unit.

11. A method for dynamically selecting alternate operating parameters of a mobile  
2 radio unit based on a position of the mobile radio unit, comprising the steps of:  
providing a controller;  
4 storing a look-up table with position values in a memory coupled to the  
controller;  
6 calculating a position of the mobile radio unit;  
comparing the position values of the look-up table with the position of the  
8 mobile radio unit;  
determining the geographical location of the mobile radio unit from the look up  
10 table;  
selecting, dynamically, at least one parameter based upon the determined  
12 location; and  
encrypting information in accordance with the at least one parameter.

12. The method of claim 11, further comprising invoking the appropriate encryption  
2 level corresponding to the geographical location of the mobile unit.

13. An apparatus for dynamically selecting alternate operating parameters of a  
2 mobile radio unit based on a position of the mobile radio unit, comprising:

- a controller;
- 4 a look-up table with position values in a memory of the controller;
- a means for calculating a position of the mobile radio unit;
- 6 a means for comparing the position values of the look-up table with the position  
of the mobile radio unit;
- 8 a means for determining the geographical location of the mobile radio unit from  
the look up table;
- 10 a means for selecting, dynamically, at least one parameter based upon the  
determined location; and
- 12 a means for encrypting information in accordance with the at least one  
parameter.

14. The apparatus of claim 13, wherein the look up table includes encryption levels  
2 which correspond to geographical locations.

15. The apparatus of claim 14, wherein the means for selecting functions to select  
2 from the look-up table an encryption level which corresponds to the geographical  
location of the mobile radio unit.

16. The apparatus of claim 15, further comprises a means for invoking the
- 2 appropriate encryption level corresponding to the geographical location of the mobile radio unit.

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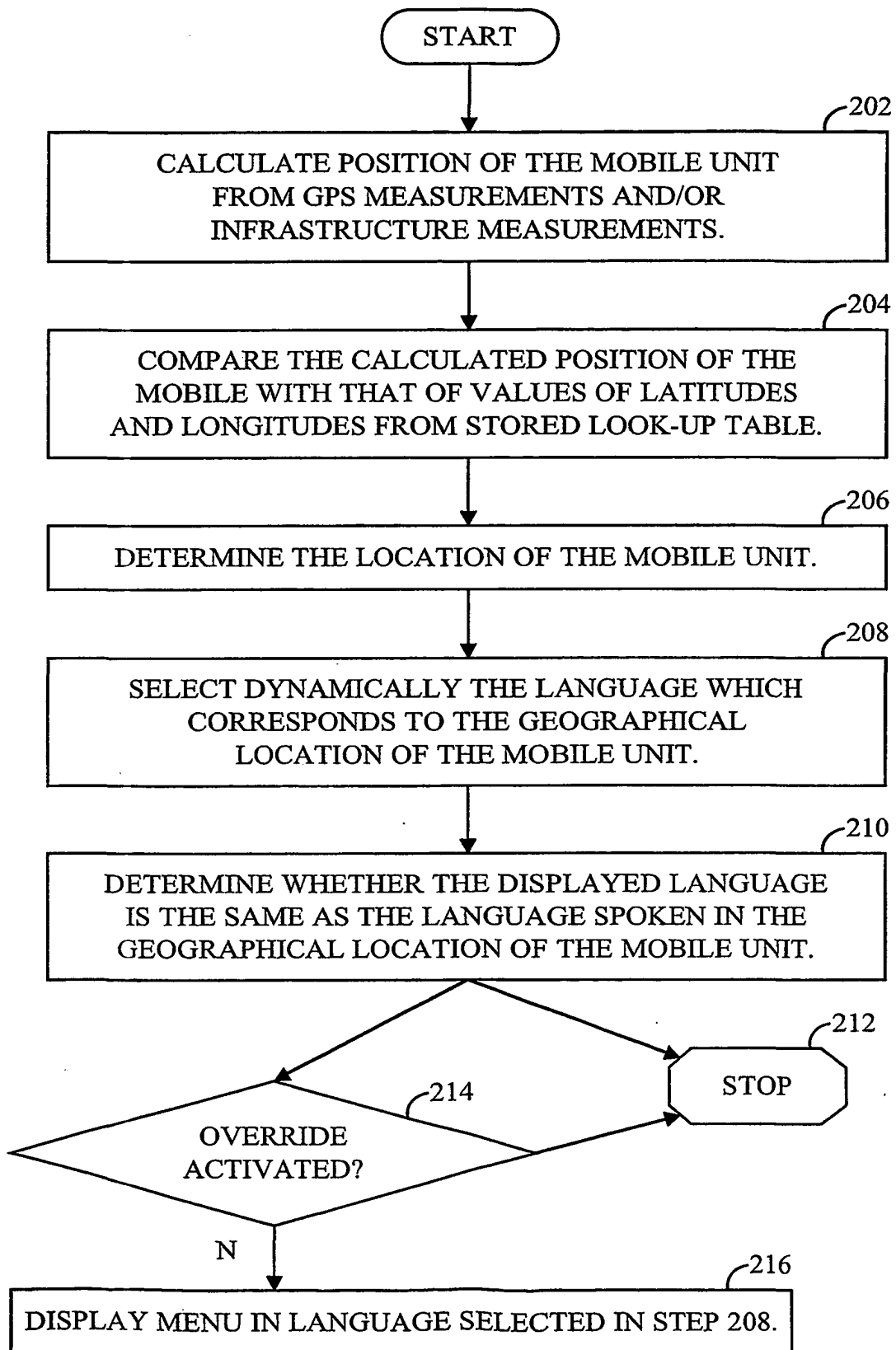


FIG. 1

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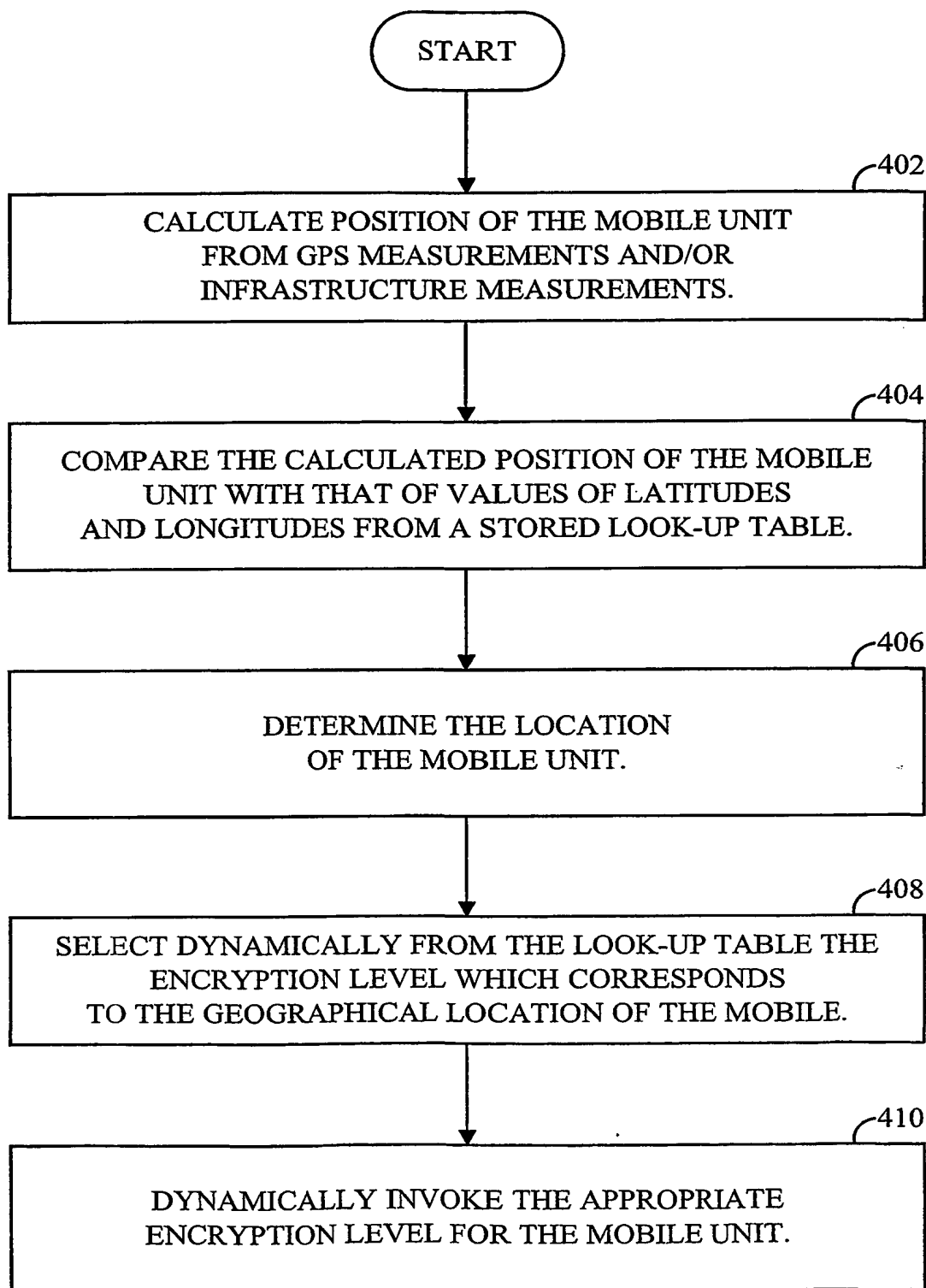


FIG. 2



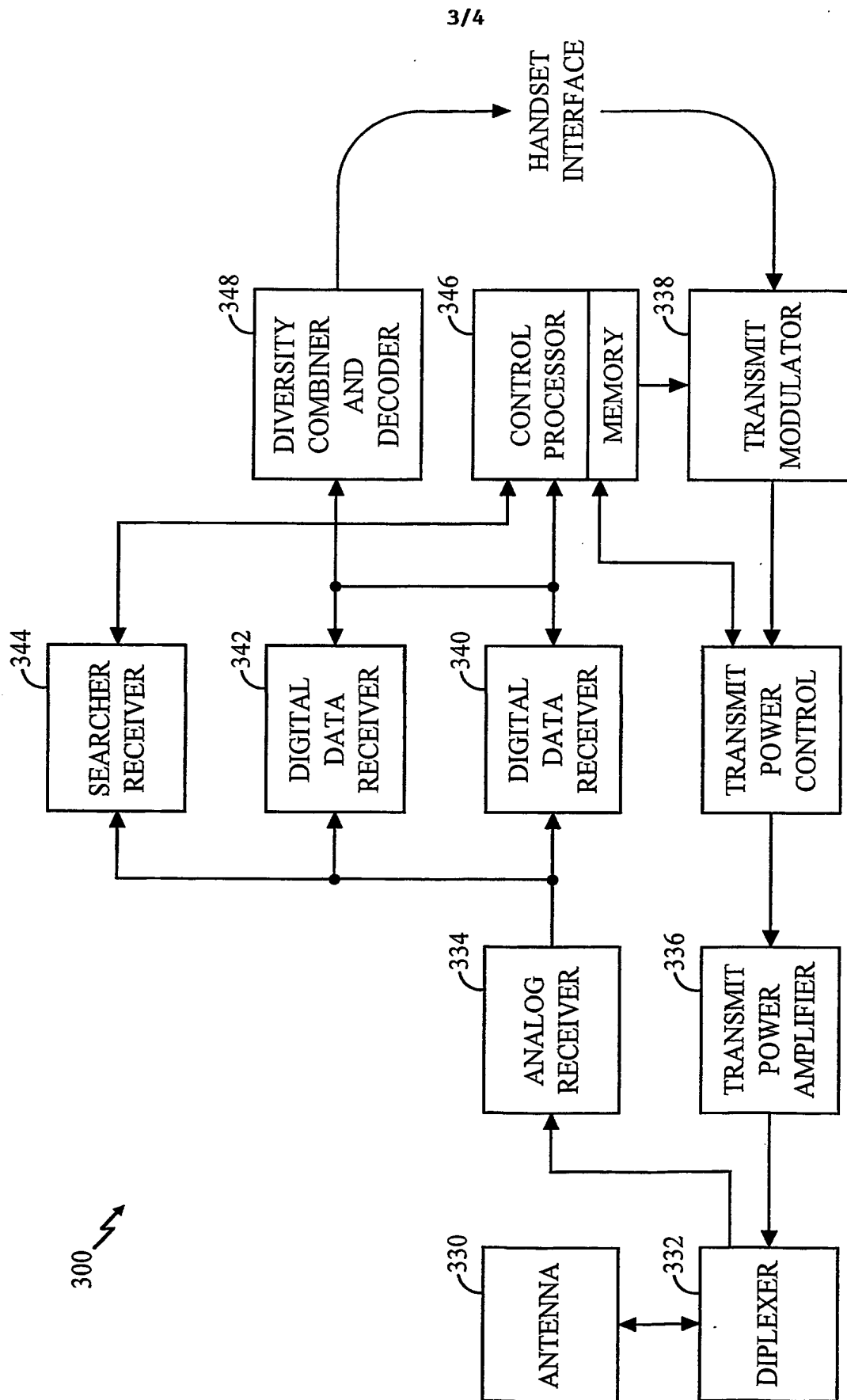


FIG. 3



**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**(88) Date of publication of the international search report:**

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## INTERNATIONAL SEARCH REPORT

International Application No

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q7/32

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 99 41927 A (LINKOLA JANNE ;SONERA OY (FI); HOKKANEN TUOMO (FI)) 19 August 1999 (1999-08-19) page 14, line 5-10 page 16, line 17-18 page 7, line 30 -page 9, line 2	1,6
Y	WO 98 08314 A (GINIGER MICHAEL L ;HILTON WARREN SCOTT (US)) 26 February 1998 (1998-02-26)	1-16
Y	* page 4, line 35 * * page 15, line 18 - page 16, line 13 * * page 22, line 9 - page 23, line 19 * figures 2,3A,4	1,13
Y	page 7 -page 9	2-10
Y	page 11, line 5-30; figure 7	12,14-16
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

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## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 01/29156

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	column 2, line 55 -column 3, line 41	1,6
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